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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/679,799

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Susan W. Zogbi

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EXAMINER

TOWA, RENE T

ART UNIT

PAPER NUMBER

3736

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/679,799	Applicant(s) ZOGBI ET AL.	
	Examiner RENE TOWA	Art Unit 3736	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office action is responsive to an amendment filed May 27, 2008. Claims 1-24 are pending. Claims 1 & 14 have been amended. No claim has been added or cancelled.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. **Claims 1-2, 11, 14-15 and 21-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendes et al. (US 6,245,109) in view of Petrovic (US 6,215,374).

In regard to **claim 1**, Mendes et al. disclose(s) a system (see figs. 2-7) for a performing a remote measurement of the displacement between two adjacent objects (24, 28), comprising:

a pair of sensors (34, 36), wherein one of the sensors 34 includes a magnetic rod fixed within a sensor coil, such that the rod does not move relative to the coil (see col. 8, lines 62-67; col. 9, lines 1-7);

wherein said sensor 34 is operable to form a tuned circuit; and

an interrogator 40 having a transmit coil and at least one receive coil, transmit circuitry for delivering to the sensor coil an excitation signal through a range of frequencies, and receive circuitry for receiving a response signal from the sensor coil (see col. 9, lines 48-58 & 67; col. 10, lines 1-16);

wherein the interrogator is operable to detect a peak frequency from the sensor when the sensors are placed substantially parallel, but not attached to, each other in an

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environment where displacement is to be measured (see col. 7, lines 1-12; col. 9, lines 15-30).

In regard to **claim 2**, Mendes et al. disclose(s) a system further comprising means for electrically resonating said coil (see col. 9, lines 48-58 & 67; col. 10, lines 1-16).

In regard to **claim 11**, Mendes et al. disclose(s) a system wherein the interrogator 40 has digital processing circuitry (via a microprocessor 54) for processing the received signal (see col. 10, lines 1-16).

In regard to **claims 14 & 23**, Mendes et al. disclose(s) a method for determining displacement between two objects (24, 28), comprising the steps of:

attaching a first sensor 34 to a first location 24;

attaching a second sensor 36 to a second location 28;

wherein one of the sensors has a rod, a coil, and a capacitor, electrically connected such that the rod, the sensor coil, and the capacitor form a tuned circuit (see col. 7, lines 1-12; col. 8, lines 62-67; col. 9, lines 1-7);

interrogating a sensor with an interrogation signal; and

receiving a response signal from said sensors; and

calculating the distance between the steps based on the receiving step (see figs. 2-7; col. 7, lines 1-12; col. 9, lines 15-30, 48-58 & 67; col. 10, lines 1-16).

In regard to **claim 15**, Mendes et al. disclose(s) a method wherein the sensors (34, 36) are attached by being embedded within a living body (see figs. 2-7).

In regard to **claim 22**, Mendes et al. disclose(s) a method wherein said sensor 34 is self-resonating in response to the interrogation step (see col. 8, lines 62-67).

Mendes et al. discloses a system, as described above, that fails to explicitly teach a system wherein a pair of tuned sensors are positioned to form an overcoupled resonant circuit.

However, **Petrovic** teaches that it is well-known to provide a system (10, 100) comprising a pair of tuned sensors (12, 14; 120, 140) (see figs. 1A-B; col. 3, lines 1-6) wherein the pair of sensors (12, 14; 120, 140) is positioned to form an overcoupled resonant circuit, such that their frequency response 26 has two peaks (see fig. 2; col. 3, lines 55-67; col. 4, lines 1-8), and such that the distance between the two peaks changes when the distance between the sensors (12, 14; 120, 140) changes (see col. 3, lines 30-42).

In regards to **claims 1, 14, 21 & 23**, Mendes et al. teach a system for measuring the displacement between of a tuned-circuit sensor 34 and a magnetic element 36 (see col. 7, lines 1-12; col. 8, lines 62-67; col. 9, lines 1-13); since Petrovic teaches that it is well-known and least expensive to provide double tuned circuits for producing a predictable bandpass-like filter response (see figs. 1A-B; see col. 3, lines 1-6) such that the relative position of the tuned circuits with respect to each other directly correlates with the degree of coupling (see col. 3, lines 30-42) and the signal response (see col. 3, lines 55-67; col. 4, lines 1-8), it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. with a pair of tuned circuits as taught by Petrovic in order to deduce the displacement

between the well-known, least expensive tuned circuits whose predictable bandpass-like filter response is known to correlate the degree of coupling to the relative position of the tuned-circuits with respect to each other.

Similarly, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. with a pair of tuned sensors that are overcoupled as taught by Petrovic in order to achieve a predictable bandpass-like signal response that exhibits low insertion loss (i.e. little to no energy or amplitude loss) and is thus relatively immune to noise from external sources (see Petrovic, col. 1, lines 34-49 & 55-59; col. 4, lines 1-8).

In regard to **claim 24**, since Mendes et al. teach a system comprising sensors that are attachable to a subject's articulating bones to measure a displacement between the bones to estimate the degree of wear between articulating bones (see col. 7, lines 34-60), it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to modify the system of Mendes et al. as modified by Petrovic, above, in order to measure a displacement of portions of a spine so as to determine a wear of the surfaces between the bones (i.e. perhaps to determine whether there is a need for cartilage or spinal disk replacement).

4. **Claims 3 & 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendes et al. ('109) in view of Petrovic ('374) in view of Hansen (US 4,618,822).

Mendes et al. as modified by Petrovic discloses a system, as described above, that fails to explicitly teach at least one end mount operable to be attached to one of the objects.

Hansen disclose(s) a system comprising a pair of sensors (10, 110; 10', 110'), each sensor (10, 110, 10', 110') having a magnetic rod 11, a sensor coil 13 and capacitor 15; wherein each sensor is attached by means of an end mount (17, 19) at one end of each sensor 10 to a skeletal object (see fig. 1).

Since Mendes et al. and Hansen teach sensors that are attachable to a subject's bones to measure a displacement of the bones, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. as modified by Petrovic, above, with an end mount as taught by Hansen in order to attach the sensors to the bones.

5. **Claims 4-6, 13, & 17-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendes et al. ('109) in view of Petrovic ('374) further in view of Shimizu et al. (US 4,556,886).

In regards to **claims 4-6 & 17-19**, Mendes et al. as modified by Petrovic discloses a system, as described above, that fails to teach transmit and receive coils in a nulling geometry. However, **Shimizu et al.** teach several embodiment of at least one transmit coil (4A-B; 76-77) and at least one receive coil (5; 72-75) configured in a nulling geometry (see figs. 2, 14 & 17; column 2/lines 65-68; column 3/lines 1-15; column 4/lines 14-23 & 31-40; column 6/lines 13-16; column 10/lines 62-66; column 11/lines 29-37). It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. as modified by Petrovic with transmit and receive coil geometries as taught by Shimizu et al. in order to obtain the

displacement by measuring the phase difference, that has been initialized at zero phase, between the transmit and receive coils (see Shimizu et al, column 4/lines 31-40).

In regards to **claim 13**, Mendes et al. as modified by Petrovic discloses a system, as described above, that fails to teach means for adjusting the resonance of the sensor. However, **Shimizu et al.** disclose a system comprising means 11 for adjusting the resonance of a sensor 1 (see fig. 7; column 7/lines 34-38 & 48-53). It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. as modified by Petrovic with a means for adjusting the resonance of the sensor as taught by Shimizu et al. in order to cancel the phase difference errors due to mounting (see Shimizu et al., column 7/lines 54-60).

6. **Claims 7-9 & 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendes et al. ('109) in view of Petrovic ('374) further in view of Bullara (US 4,127,110).

Mendes et al. as modified by Petrovic discloses a system, as described above, that fails to explicitly teach sensors that are encased in a flexible sheath.

However, **Bullara** discloses a system wherein the sensor is enclosed in a biocompatible flexible sheath 29 (see fig. 2; column 3/lines 41-44 & 48-56; column 4/lines 38-40; column 5/lines 21-31).

It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. as modified by Petrovic with biocompatible sensor encasings as taught by Bullara in order to provide a housing structure that is not biologically reactive as it is well-known in the art. Moreover, it would have been obvious to one of ordinary skill in the art at the time Applicant's

invention was made to provide the system of Mendes et al. as modified by Petrovic as further modified by Bullara with sensors made or coated with a biocompatible material since such a modification would serve the same function of providing sensors that are not biologically reactive.

7. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over Mendes et al. ('109) in view of Petrovic ('374), and further in view of Codina et al. (US 5,497,804).

Mendes et al. as modified by Petrovic disclose a system, as described above, that fails to explicitly teach a system comprising a mixer.

However, **Codina et al.** teach that it is known to provide a mixer 315 to demodulate or compare two signal sources with respect to each other (see fig. 3; col. 3, lines 13-37).

since it is known to provide a comparator for comparing any difference between the voltage of the transmitted signal and that of the received signal so as to determine the voltage of the signal response (see fig. 2 and col. 12, lines 4-11 of US 4,618,822 to Hansen) and since Cordina et al. teach that it is known to provide a mixer to modulate two signals with respect to each other, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. as modified by Petrovic with a mixer as taught by Codina et al. for mixing the transmitted signal and the received signal in order to demodulate the received signal so as to determine the frequency of the signal response.

8. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Mendes et al. ('109) in view of Petrovic ('374) further in view of Aronow et al. (US 3,628,381).

Mendes et al. as modified by Petrovic discloses a system, as described above, that fails to explicitly teach a mutual inductance bridge.

However, Aronow et al. disclose a system comprising a mutual inductance bridge connected to a coil 11 (see fig. 1).

It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide the system of Mendes et al. as modified by Petrovic with an inductance bridge as taught by Aronow et al. in order to compensate for the temperature deviations in the coil (see Aronow et al., column 3/lines 26-45).

Response to Arguments

9. Applicant's arguments filed May 27, 2008 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RENE TOWA whose telephone number is (571)272-8758. The examiner can normally be reached on M-F, 8:00-16:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Max Hindenburg can be reached on (571) 272-4726. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. T./
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/Max Hindenburg/
Supervisory Patent Examiner, Art Unit 3736